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STUDIES IN THE AMERICAN EPHYDRIDAE (DIPTERA)

II. A REVISION OF THE SPECIES OF THE GENERA NOTIPHILA AND DICHAETA

BY EZRA T. CRESSON, JR.

In the study of the cosmopolitan genus *Notiphila* the student will encounter some difficulty in trying to separate a few of the species, and it will soon become evident that a thoroughly exhaustive study will be necessary to establish their limits. The material upon which this paper is based contains over five hundred and fifty specimens, and is separable into twenty-three forms, which are given specific rank, although I recognize that some may be merely varieties or subspecies. Many of the forms are distinguished by characters which one would expect to find subject to variation, but the series representing these are very constant in such characters.

The present paper is, and must be, preliminary, but will serve as a foundation for a more exhaustive treatment when additional material can be studied. Introductory remarks, acknowledgments and general explanations will be found in the first paper of this series.¹

I will add here that all material examined from Costa Rica was collected by Dr. Philip P. Calvert, and is in the collection of the Academy of Natural Sciences, Philadelphia, unless noted to the contrary. It will, therefore, be unnecessary to mention this fact in the lists of specimens examined.

NOTIPHILA Fallen

1823. *Notiphila* Fallen, Dipt. Suec. Hydromyz., 7.

This is the type-genus of the Notiphilinae and forms with *Dichaeta* and *Paralimna* the group Notiphilae. This group is characterized by having erect extensor bristles on the middle tibiae.

¹ Trans. Amer. Ent. Soc., xlii, 101 to 124, (1916).

The validity of *Dichaeta* as a distinct genus is somewhat doubtful. *Paralimna*, however, is quite distinct, differing from *Notiphila* and *Dichaeta* in the extension of the costa to the fourth vein, whereas in the present genus it terminates at or slightly beyond the third. In general appearance *Hydrellia* resembles *Notiphila*, but the costal character will separate them at once.

Generic Description.—All the known species of this genus are opaque and more or less densely pruinose, excepting the abdomen. The macrochaetae are generally well developed. Eyes bare, vertically oval. Frons with a very strong, reclinate frontal bristle and a few proclinate orbital setulae; frontalia more or less distinct and darker in color. Face gently convex in profile with retreating epistoma; mesofacial area bare, flat, transversely convex below and weakly carinate above; facalia distinct and also slightly convex, bearing scattered setulae, and along its inner margin the usual facial bristles which are sometimes hair-like. Cheek with distinct bristle. Mouth-opening moderate, not gaping, with margin bare. Antennae with apically spinose second joint; third elongate; arista long plumose above.

Thoracic chaetotaxy: Dorsocentrals 1:1, prescutellar 2, post-alar 1, supra-alar 1, presutural 1, humeral 1, notopleural 2, mesopleural 2, sternopleural 1, scutellar 4. Abdomen with five segments in the male. In our species the halteres are yellow and the abdominal markings consist of dark, medianly interrupted, basal bands on segments two to five. These bands sometimes dissolve into spots arranged in two or four longitudinal series, or may be entirely absent. Fifth segment of male usually differentiated, sometimes characteristically developed.

Legs simple, with middle tibiae bearing three or four erect extensor bristles: one at base, one at basal third, one at apical third and one sometimes near the apex. The basal segment of the posterior tarsi sometimes with one or more suberect black bristles below near base (described herein as the "tarsal fascicle"). Wings normal with costa extending to or little beyond tip of third vein.

Genotype.—*Notiphila cinerea* Fallen (Westwood, 1840).

In contradistinction to *Paralimna* this genus is rather heterogeneous in its composition, as mentioned above, although it contains some difficult species, so that, excepting those closely allied forms, the species are quite easy to distinguish. The females, however, will give more trouble. The sexes of most of the species are easily separable, the males in these having the fifth abdominal segment enlarged, convex apically, sometimes abnormally developed. The species of the interesting *furcata*-group, although simulating those of *Dichaeta* in the males, are truly Notiphiline in all other respects and are therefore placed in the present genus.

The known species of this genus readily divide into two well-marked groups, which are here given subgeneric rank. They are characterized by the number of extensor bristles on the middle tibiae and are very constant in this respect. The arrangement of the facial bristles and of the abdominal markings are also of some value, but are not as constant.

Systematically the species may be arranged as follows:

Middle tibiae with three extensor bristles (*Notiphila*).

Middle tibiae of male not ciliate beneath (*riparia*-group).

Thorax unicolorous, without irrorations or stripes. **riparia**

Thorax more or less irrorated or striped.

Mesonotum irrorated. **punctifera**

Mesonotum faintly, if at all striped. **bicolor, erythrocer**

Mesonotum distinctly striped. **facialis**

Middle tibiae of male ciliate beneath (*cinerea*-group).

Mesonotum, at least laterally, distinctly striped.

Abdomen of male normal, not arched. **virgata**

Abdomen of male narrow, arched, with fifth segment markedly developed. **vittata, nudipes**

Mesonotum not striped.

Abdomen ovate, with or without two series of triangular spots.

loewi, floridensis

Abdomen rounded, with or without series of elongate spots.

biseriata, cognata, fulvimana

Middle tibiae with four extensor bristles (*Agrolimna*).

Fifth abdominal segment of male convex above, not armed.

Mesonotum not striped.

Abdominal markings broad, not attenuating laterally, more or less shining. **scalaris, atripes, occidentalis**

Abdominal bands attenuating laterally. **olivacea, macrochaeta**

Mesonotum distinctly striped. **pulchrifrons, frontalis**

Fifth abdominal segment of male concaved above, attenuated, and armed, at apex with two long bristles. **bispinosa, furcata**

Table of Species

- A. Middle tibiae with three extensors; facial bristles confined to lower half of face (*Notiphila*).
1. Bristles of legs weak and minute; abdomen of male shrunk on dorsum, and middle tibiae ciliate beneath (Nearctic species) . . . **nudipes** p. 43.
Bristles well developed. 2
 2. Mesonotum distinctly striped, at least with a broad lateral stripe. . . . 10
Mesonotum not distinctly striped. 3

3. Abdomen immaculate; middle tibiae of male ciliate.4
 Abdomen with two series of spots.5
 Abdomen with four series of spots, or banded.8
4. Tarsal fascicle black; facial bristles close, confined to lower third (Nearctic species).**loewi** p. 44.
 Tarsal fascicle yellow; facial bristles well separated, confined to lower half of face (Nearctic species).**cognata** p. 46.
5. Abdominal spots triangular, not attaining apices of segments.6
 Abdominal spots elongate, attaining apices of segments but not produced laterally; second costal section four times as long as third (Nearctic species).**biseriata** p. 46.
 Abdominal spots triangular, attaining apices and lateral margins; second costal section three times as long as third (Cuban species).**fulvimana** p. 47.
6. Second antennal joint yellow; arista with 9 to 11 hairs; frons much broader than long; middle tibiae not ciliate.**erythroceræ** p. 36.
 Second joint black; arista with 6 to 7 hairs; frons not broader than long; middle tibiae of male ciliate.7
7. Face broad, silvery white; cheeks twice as broad as third antennal joint (South Florida species).**floridensis** p. 46.
 Face narrow, yellow or gray; cheeks not much broader than third antennal joint (Nearctic species).**loewi** p. 44.
8. Mesonotum without any trace of stripes on dorsum; abdominal spots blackish and more or less shining (Nearctic species).**riparia** p. 32.
 Mesonotum with indications or suggestions of stripes; abdominal spots obscure or faintly shining.9
 Mesonotum with brown irrorations at bases of setulae; abdominal spots brown, obscure or slightly shining (Neotropical species).**punctifera** p. 34.
9. Second antennal joint and fore legs black (Nearctic species).**bicolor** p. 35.
 Second antennal joint and fore tibiae yellow.**erythroceræ** p. 36.
10. Face with a median brown stripe; middle tibiae of male not ciliate. (Neotropical species).**facialis** p. 38.
 Face immaculate; tibiae normal.
 Lateral mesonotal stripe broad; abdominal spots isolated or narrowly connected basally; abdomen of male arched, depressed on dorsum, with fifth segment much developed (Nearctic species).**vittata** p. 42.
 Lateral stripe narrow; abdominal spots broad and more or less connected basally; abdomen normal (Neotropical species).**virgata** p. 40.
- B. Middle tibiae with four extensors; facial bristles fine, series extending to foveal region (*Agrolimna*).
 1. Antennae and palpi black.2
 Palpi yellow.7
 2. Tarsal fascicle black; mostly olivaceous species with rather distinct frontal stripes; abdominal bands attenuating laterally; arista with 8 to 10 hairs.3
 Tarsal fascicle pale.4

3. Tarsal fascicle of male consisting of a long bristle, nearly as long as first tarsal joint; abdominal bands of female small, abbreviated laterally.
macrochaeta p. 54.
Tarsal fascicle consisting of a minute black bristle; abdominal bands of female broad, almost attaining lateral margins. **atrisetis** p. 52.
4. Abdominal bands obscured and attenuating laterally; arista with 12 to 14 hairs. **olivacea** p. 52.
Abdominal bands broad, shining, not attenuating laterally; arista with 8 to 10 hairs. 5
5. Abdomen slender, elongate; tarsi black. **atripes** p. 50.
Abdomen ovate; tarsi more or less pale. 6
6. Western nearctic species. **occidentalis** p. 51.
Eastern nearctic species. **scalaris** p. 49.
7. Frons and mesonotum distinctly striped. 8
Frons and mesonotum not distinctly striped; sixth abdominal segment of male conical with two approximate, apical, upcurved bristles. 10
8. Dark abdominal bands broad and broadly attaining apical margins of segments (Neotropical species). **frontalis** p. 56.
Dark bands not or narrowly attaining apical margins, sometimes reduced to spots. 9
9. Frontal stripes velvety black. var. **signata** p. 57.
Frontal stripes obscured, not velvety black. **pulchrifrons** p. 55.
10. Second antennal joint black; sixth abdominal segment of male with a long, cylindrical, bristle-bearing appendage. **furcata** p. 59.
Antennae yellow; sixth segment without appendage. **bispinosa** p. 58.

Subgenus **Notiphila**

The species comprising this subgenus are generally ochreous in color, becoming cinereous below, opaque; seldom are the dark abdominal markings shining. The facial bristles are usually stout, limited to three or four in a series, not or scarcely attaining the middle of the facial profile. In those having these bristles hair-like the series is more extended, thus showing a tendency to intergrade with species of the subgenus *Agrolimna*. In the present subgenus the antennae are generally, and the palpi are always, yellow or tawny. The abdomen is marked with brown spots, or in some species is immaculate; while on the other hand some have the spots more or less transversely connected, forming basal bands on the segments. However, these bands always have their posterior margins emarginated, or are constricted between where the spots normally are, and are more or less dilated at the middle longitudinal gray stripe. The middle femora of the male are more or less distinctly ciliate

beneath, and, in one group, their tibiae are also ciliate beneath with a comb-like series of short, erect setulae. In both sexes there are only three erect extensors on the middle tibiae, the fourth or preapical one being absent or very minute.

The species may be separated into two rather poorly defined groups, which are well worthy of note but hardly of nomenclatorial recognition. These groups are based wholly on male secondary sexual characters, namely, the ciliation of the middle femora and tibiae, the females apparently not showing any correlation. For this reason I have not considered the groups except in the arrangement of the species. They may be characterized as follows:

Middle tibiae not ciliate.	<i>riparia</i> -group
Middle tibiae ciliate.	<i>cinerea</i> -group

The *riparia*-group

This group contains species which seem to be more generalized than any others in the genus. Some of the species are difficult to separate and it is probable I have been too radical in their treatment; but am at loss sometimes to decide whether or not a specimen or a small series represents a distinct species, or only an extreme variety of, or perhaps a subspecies of, another known or unknown species. My material, although the most extensive ever studied of the American species, is discouragingly lacking in large series of such forms. Consequently synonymy is liable to occur, but I prefer such to erroneous determinations or indiscriminate lumping.

The species belonging here have the middle femora of the male weakly, and their tibiae not at all, ciliate. It is rather a heterogeneous group and may not stand as here considered.

Notiphila riparia Meigen

1830. *Notiphila riparia* Meigen, Syst. Besch., vi, 65.

After comparing the American specimens with those of the European *riparia*, I can find no characters for specific differentiation, nor even of subspecific value. In comparison with our other species of this group, we find the present one more robust and with stouter bristles; the mesonotum is evenly colored, without any indication or suggestion of stripes, especially mesad of the intra-alar series, although isolated spots on the lateral margin and at the lateral roots of the scutellum, may be present. The

abdominal markings are nearly shining, very dark brown or nearly black, not overcast with pollen, but are never distinctly shining. This species is rather unique in that the sexes are not as easily determined as are the other species, on account of the similarity of the fifth abdominal segments of the two sexes, and there are no other secondary sexual characters that I can find.

Description.—♂. Black; antennae and palpi tawny; bases and apices of tibiae and all tarsi more yellowish; halteres yellow; wings yellowish hyaline with yellow veins; tarsal fascicle black.

Opaque; general color olive to buffy-olive becoming gray below. Thorax immaculate, evenly colored or with spot on lateral margin of mesonotum and large spot or stripe on mesopleura, brown; no irrorations. Abdomen more or less shining, especially the dark brown markings which are rather elongate and in four series, well separated, but not attaining apical margins; hairs and bristles, especially on apical margins, emitted from brown dots.

Frons much broader than long, in profile obliquely flattened; orbits parallel. Face slightly narrower, longer than broad, in profile flat above, convex below, or in general, weakly convex; foveae and carina weak; parafacials linear, scarcely dilating below; four stout bristles on lower half. Cheeks narrow, scarcely equalling third antennal joint in width. Antennae small with stout thorn; third joint nearly three times as long as second, subconical; arista long, with twelve to fourteen long hairs. Scutellum flat, broad apically. Abdomen ovate with subequal segments. Middle femora and tibiae weakly, if at all, ciliate; latter with three extensors. Wings narrow; second costal section one and a half to two times as long as third. All bristles long and stout. Length.—3.5 to 5 mm.

♀. Similar, excepting for femoral ciliation.

Described from Europe. The above description is based on the series examined as given below.

Specimens Examined.—3 ♂, 11 ♀.

MASSACHUSETTS: Nantucket, VII, 20, 1910, 2 ♀, [B. S. N. H.].

NEW YORK: Ithaca, 1 ♂, 1 ♀, [C. U.].

NEW JERSEY: Salt Meadows, VIII, (Wiedt), 2 ♀, [Harbeck].

GEORGIA: Billy's Island, Okeefenokee Swamp, VI, 1912, 1 ♂, [C. U.].
Prairie, Honey Island, Okeefenokee Swamp, VI, 1, 1912, 1 ♂, [C. U.].
Thalman, IV, 28, 1911, 1 ♀, [C. U.].

OHIO: Cincinnati, VII, 9 to 16, 1901, 1 ♀, [Ohio]. Kent, VI, 18 to 22, 1900, 1 ♀, [Ohio]. Sandusky, Cedar Point, VII, 8, 1901, 1 ♀, [Ohio]; VII, 18 to 20, 1904, 2 ♀, [Ohio].

Variations.—There is some little variation in size, in which respect the species contains the largest specimens I have seen belonging to the genus. The species intergrade nicely with *erythroceræ*. The American specimens may vary slightly from

those of Europe in being somewhat darker, especially respecting the antennae and legs, and possibly the frons and face are slightly broader.

Before me is a female; Toronto, Ontario, Canada, VII, 4, 1913, (M. C. VanDuzee); which is evidently not conspecific with the above series, but I do not care to describe it as new, as it is a female. The general color is more yellowish; second antennal joint black; facial bristles weak; abdominal spots more connected at bases; fore tibiae and tarsi black. Evidently, however, it belongs to this group.

Notiphila punctifera new species

?1830. *Notiphila exotica* Wiedemann, Auss, Zweifl. Ins., ii, 590.

?1896. *Notiphila bellula* Williston, Trans. Ent. Soc. London, 1896, 390.

This and the following species of the group differ from *riparia* in their greater opacity, and the more or less irrorated or vittate mesonotum. The vittae, however, may not be distinct, but there are some indications or suggestions of such mesad of the intra-alar series. The abdomen is more opaque, with the markings not so dark and shining.

In the present species the frons is broad and the hairs of the arista numerous as in *riparia*, but the mesonotum is irrorated with brown dots at the bases of the setulae and shows faint vittae. It is closely related to, and may be a subspecies of, *erythrocer*a Lw. Length.—3.5 to 4 mm.

Holotype.—♀; Corumbá, Brazil, May, (H. H. Smith), [A. N. S. P. No. 6109]. *Paratypes*.—1 ♂, 1 ♀; topotypical.

Specimens Examined.—2 ♂, 3 ♀.

BRAZIL: Corumbá, May, (H. H. Smith), 1 ♂, 2 ♀, [A.N.S.P.].

PARAGUAY: San Bernardino, (Barbarczy), 1 ♂, 1 ♀, [H. N. M.].

Synonymy.—I think this will prove to be Williston's species, but cannot say this of Wiedemann's. The synonymy of the latter is based on the yellow palpi and antennae and the four series of abdominal spots. The examinations of the types will readily establish the true synonymy.

Variations.—I have also a specimen from Brazil (H. H. Smith), which has the facial bristles weaker and more hair-like, in series of four extending higher up on the face. The mesonotal vittae are more apparent, but the irrorations are less distinct. It was received from Prof. Williston under a manuscript name.

A female from Martinique, West Indies, VII, 26, (A. Busck), [U. S. N. M.], is doubtfully conspecific with the above series. Having seen only one specimen, the difference may be due to variation, on account of the rather poor condition of the specimen. The yellow antennae and legs are darker and the mesonotum more distinctly irrorated and the abdomen more shining. It suggests *N. decorata* Williston, excepting that the mesonotum is irrorated with brown.

Notiphila bicolor new species

Here we have a very unsatisfactory species, mainly on account of the lack of a good series. Its similarity to *erythroceræ* is evident and of which it is possibly only a variety or subspecies. The study of a large series may reveal some variation and make it difficult to separate it from that species. In the type specimen there is noticeable contrast between the brown thorax and the gray abdomen. The second antennal joint and the fore legs are black.

Description.—♂. Black; base of third antennal joint, palpi, halteres, apices of femora, bases of fore tibiae, middle and hind tibiae, excepting pre-apical ring, and middle and hind tarsi, yellow or tawny; tarsal fascicle black; wings hyaline, veins yellowish.

Opaque; frons, mesonotum and scutellum, yellowish brown or old gold; frontal and facial orbits silvery; face gray, tinged with yellow. Cheeks, occiput, pleura, pectus, and abdomen, gray. Mesonotum with small, brown, presutural spot and a similar spot on mesopleura. Abdomen with a pair of elongate median and rounded lateral spots on segments two to five; the lateral spots diminishing until nearly obsolete on fifth segment. Femora faintly grayish.

Frons broad as long; orbits parallel. Face slightly narrower, concaved above; foveae and carina weak; about three moderately developed bristles on lower third of profile. Cheeks hardly as broad as third antennal joint. Spine of second antennal joint small; third joint large, straight above, convex below twice as long as second; arista with seven to eight hairs. Scutellum flat, broad apically. Abdomen ovate; segments four and five subequal in length. Middle femora of male sparingly, and their tibiae minutely, ciliate. Wings long, with second costal section two and a half times as long as third. Length.—3 mm.

Holotype.—♂; Columbia, Missouri, May 26 to June 8, 1906, (C. R. Crosby), [Cornell Univ.].

Variation.—Before me are two specimens (♀ ?) [Illinois] which seem to belong here, showing but little variation from the type. The arista, however, has nine hairs and the bristles of the face are finer and somewhat more numerous.

Notiphila erythrocer Loew

1878. *Notiphila erythrocer* Loew, Zeit. f. Ges. Naturw., 194.

?1830. *Notiphila difficilis* Weidemann, Auss. Zweifl. Ins., ii, 591.

1906. *Notiphila varia* Jones, Univ. Cal. Tech. Bull., i, 153.

Here we have a species, represented in my material by an extensive series, which is seemingly in the process of breaking up, there being much variation, especially in the markings and in the color of the antennae and legs; at present, however, I cannot find any satisfactory lines of demarcation between the various forms. This species is sometimes liable to be confused with its closely allied species, but not with any special one, and this fact is responsible for the possible synonymy suggested under those species. I do not doubt my determination of this species.

Specimens having the mesonotum faintly vittate suggest the recessive forms of *facialis*; while those having only two series of abdominal spots suggest species in the *cinerea*-group; while those with the more intense, less opaque, abdominal pattern are liable to be confused with *riparia*. However, in general there should be little difficulty in recognizing this species. The best distinguishing characters are the broad face, tawny or yellow second antennal joint, the size, number and position of the facial bristles, and the immaculate or faintly vittate mesonotum. These facial bristles are strong, two or three in number, limited to the lower third or fourth of the facial profile; the uppermost being hardly above the level of the buccal orbit. The general color is ochreous, even the browns and the dark areas are overcast with this color. The females should not be confused with those of *virgata*, which have the browns of the abdomen more or less shining and the mesonotum distinctly vittate. Rarely are the abdominal spots shining in this species, and the antennae are always pale, rarely brown or the second joint blackish. The median abdominal stripe is very conspicuous in certain aspects.

Description.—Black; antennae, palpi, halteres, apices of femora, middle and hind tibiae, and tarsi, yellow; fore tibiae and tarsi brown, rarely yellow; hind tibiae rarely brown medianly; tarsal fascicle black; wings yellow.

Opaque; head ochreous; frontalia and ocellar region darker; frons sometimes golden, and vittae obsolete or at times very marked in certain aspects. Face varying from gray to golden; second antennal joint seldom infusate apically. Mesonotum brownish to yellowish olivaceous or golden, sometimes faintly vittate with brown. Scutellum concolorous or brownish on disk.

Pleura concolorous to gray below with brown mark on mesopleura. Abdomen concolorous to gray, generally with two or four series of brown spots, which vary in intensity and often coalescing into transverse bands, or all spots may be absent; hairs and bristles with basal brown dots. Cross veins of wings infusate.

Frons as broad or broader than long; orbits nearly parallel. Face about three-fourths as broad as vertex, broad as long, weakly convex; foveae weak; carina rounded; facia with one to three well developed bristles (rarely with four) which are as stout as those on cheeks. Cheeks as broad as third antennal joint. Spine of second antennal joint one-half as long as third; arista with ten to fourteen hairs. Scutellum flat, rounded apically. Genitalia inconspicuous. Middle femora of ♂ distinctly ciliate beneath. Length.—3.3 to 4.3 mm.

Type.—♀; Cuba, (Gundlach), [Mus. Comp. Zool.?],

Specimens Examined.—47 ♂, 62 ♀.

DISTRICT OF COLUMBIA: Oct. 30, (on grass), 1 ♀, [U. S. N. M.].

GEORGIA: Thalman, IV, 28, 1911, 4 ♂, 3 ♀, [C. U.].

FLORIDA: Jacksonville, III, 31, 1913, 1 ♀, [C. U.]. St. Augustine, III, 9, 1 ♂, 1 ♀, [A. N. S. P.]. St. Petersburg, VIII, 12, 1910, (J. C. Bradley), 1 ♂, [C. U.]. Biscayne Bay, (Mrs. Slosson), 2 ♂, 1 ♀, [U. S. N. M.].

LOUISIANA: Cameron, VIII, 14 to 28, 1903, 3 ♂, 9 ♀, [Ohio and U. S. N. M.]. Slidell, VII, 2 to 6, 1905, 1 ♂, 1 ♀, [Ohio].

TEXAS: Galveston, May, (F. H. Snow), 2 ♀, [Kans.].

CALIFORNIA: Riverside, Riverside County, V, 30, 1898, (B. J. Jones), 5 ♂. [Cal.]. Cotypes of *N. varia*.

CUBA: Havana, (Baker), 5 ♂, 5 ♀, [Johnson and Aldrich.].

MEXICO: Tampico, XII, 6, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

GUATEMALA: Livingston, II, 18, 1905, (C. C. Dean), 1 ♂, [U. S. N. M.]. Puerto Barrios, III, 3 to 4, 1905, (J. S. Hine), 2 ♀, [Ohio].

NICARAGUA: Granada, (C. F. Baker), 1 ♂, [U. S. N. M.].

COSTA RICA: Alajuela, 3100 ft. alt., IX, 15, 1909, (sweepings), 1 ♀. Bonnell Farm, Rio Surubres, 800 ft. alt., X, 21, 1909, (sweepings), 1 ♂, 1 ♀. Cartago, V, 17, 1909, (along ditch), 3 ♂, 4 ♀; V, 25, 1909, (along ditch), 4 ♀; X, 10, 1909, (sweeping over mud), 1 ♀; X, 27, 1909, 1 ♂, 2 ♀; XI, 21, 1909, (sweeping over mud), 2 ♂, 1 ♀; XII, 12, 1909, (sweeping over mud), 1 ♂, 2 ♀. Laguna near Cartago, II, 26, 1910, 2 ♂, 2 ♀. El Alto, 4950 ft. alt., VII, 7, 1909, (on *Melastoma* tree flowers?), 1 ♂, 8 ♀; (sweeping over swamp), 1 ♂, 2 ♀. Filadelfia, Rio Tempisque, I, 18, 1910, (on muddy beach), 1 ♂, 1 ♀. Guacimo, V, 6, 1909, 2 ♂. Juan Viñas, VII, 30, 1909, 5 ♂, 3 ♀. Peralta, VIII, 7, 1909, (sweeping near pool), 1 ♂, 2 ♀; III, 24, 1910, (sweeping over muddy road), 1 ♀. Turrucare, XII, 22, 1909, (sweeping over mud), 1 ♂, 1 ♀.

PANAMA: Bohio, Canal Zone, IV, 7, 1911, (A. H. Jennings), 2 ♂, 1 ♀, [U. S. N. M.].

COLOMBIA: Baranquilla, III, 1912, (Ujhelyi), 1 ♂, [H. N. M.].

Notes and Variations.—The Cuban and Colombian specimens have the mesonotum more distinctly vittate than is usual, but I have seen no specimens in which these vittae were fully developed.

As will be noted from the above list, this species is neotropical in its distribution, and, judging from the number of specimens and localities mentioned, it is also a very common species within its range. The species seems to be limited to the northern part of the region, i. e., north of the equator. Towards Brazil and Paraguay it is probably represented by *punctifera*.

The specimens collected at El Alto, Costa Rica, on *Melastoma* tree flowers were probably collected over swamp. Dr. Calvert did some collecting at El Alto over swamp, and it is not unlikely that there was some mistake made in labelling either the catch or the specimens. Such is the natural inference from the habitat of the species.

This species has also been reported from Porto Rico (Roeder, in Stett. Ent. Zeit., 349, 1885).

Synonymy.—The synonymy of *Notiphila varia* Jones is certain, as I have carefully examined the cotypes of that species which are before me. The dark coloration occurring on the thorax, which is so minutely described by that author, is simply a stain caused by the moisture from the mounting medium; the specimens being glued on cardboard points.

The synonymy of *N. difficilis* Wied [South America] is a surmise. It is suggested by the entire yellowish color, and the abdomen having two series of spots; but the size given is small. Although Wiedemann does not specifically mention the color of the antennae it is assumed to be yellow, being covered by the general term yellow. Should the synonymy be proved beyond a doubt, Wiedemann's name, of course, has priority.

***Notiphila facialis* new species**

This species in its typical form is unique and easily distinguished by the conspicuous median brown stripe on the face. But I have seen slight variations which suggest a possible intergradation with *erythroceræ*. By this species we pass nicely into the next group through the vittate species *virgata*.

Description.—Black. Antennae, palpi, halteres, joints of fore legs, apices of femora, tibiae except preapical ring, and middle and hind tarsi, yellow; tarsal fascicle black. Wings hyaline.

Opaque. Frons, except orbits, dark brown or olivaceous, with stripes of black in certain aspects. Frontal and facial orbits white. Face light yellow with a well-defined median stripe extending from the carina to epistoma, brown. Cheeks and occiput whitish. Thorax gray, tinged with brown above. Mesonotum with conspicuous median vitta bifurcated posteriorly, a posteriorly abbreviated dorso-central, an anteriorly abbreviated intra-alar and a broad lateral vitta, brown, a narrow notopleural stripe and a large mesopleural spot or stripe, and a low sternopleural stripe, brown. Scutellum with two brown dorsal spots and a black lateral margin. Abdomen gray, tinged with yellow, and with four series of large brown irregular spots, more or less coalescing basally and the median pair generally attaining apices of segments.

Frons slightly broader than long, with orbits slightly converging. Face much narrower, twice as long as broad, flat in profile; parafacials scarcely dilated below; bristles hair-like, short, about four in the series which is confined to lower third of face. Cheeks hardly as broad as third antennal joint. Antennal spine rather short; arista with ten to twelve hairs. Scutellum flat. Apical segment of abdomen of male shining. Middle femora of male ciliate; their tibiae minutely so. Wings long; second costal section nearly twice as long as third. Length.—3.2 to 4 mm.

Holotype.—♂; Tabernilla, Canal Zone, Panama, April 27, 1907, (A. Busck), [U. S. N. M. No. 20724]. *Paratypes*.—2 ♂, 2 ♀; topotypical.

Specimens Examined.—7 ♂, 7 ♀.

PANAMA: Porto Bello, II, 15, 1911, (A. Busck), 1 ♀, [U. S. N. M.]. Tabernilla, Canal Zone, IV, 27, 1907, (A. Busck), 3 ♂, 2 ♀, [U. S. N. M.].

BRAZIL: Corumbá, (H. H. Smith), 1 ♀, [A. N. S. P.].

PARAGUAY: San Bernardino, II to III, 1906, (Babarczy), 4 ♂, 3 ♀, [H. N. M.].

Variations.—The specimens from Brazil and Paraguay vary somewhat from the typical series. The wings are broader, with a decided yellowish tinge, and the second costal section is hardly one and one-half times as long as the third. In the Paraguay specimens the facial stripe is narrow and sometimes nearly obsolete, but of the Brazil specimen it is normal, broad and distinct.

The *cinerea*-group

This group, although typically very distinct, is, however, not sharply defined. The essential characters are the strongly ciliate middle femora and tibiae of the male. This ciliation, typically, is very distinct, of closely set bristles and hairs, which on the tibiae is of short, erect or suberect, more or less evenly arranged hairs. The tibial ciliation is sometimes difficult to dis-

cern and always require high magnification. The femoral ciliation, although also apparent in the *riparia*-group, is much more developed here, while the tibial ciliation is not at all developed in that group. The fifth segment of the male abdomen is differentiated, triangular, and convex apically.

I have examined specimens of the European *cinerea* Fallen, and have taken that species as the type of this group. *Cinerea* is also the type species of the genus.

***Notiphila virgata* Coquillett**

Pl. I, figs. 1 to 3.

1900 *Notiphila virgata* Coquillett, Proc. U. S. Nat. Mus., xxii, 259.

I place this species here, next to *erythroceræ*, on account of the apparent intergradation of the two. In this group it is rather isolated by its vittate mesonotum, yellow antennal joint and quadriseriated abdominal design. On the other hand it is very distinct from *erythroceræ*, and in general easy to distinguish, although the vittate individuals of that species are often confusing. The females may be difficult to separate from those of the recessive forms of *facialis*.

I have examined the type of this species.

Description.—Black; antennae except apex of third, and rarely the second, joint, palpi, halteres, knees, bases of fore tibiae and of their tarsi, middle and hind tibiae and their tarsi, yellow or tawny; tarsal fascicle black; wings brownish hyaline with pale veins.

Opaque; frons olivaceous to golden, with vittae and preocellar dash darker; face and cheeks light yellow, sericeous; occiput, pleura and femora gray. Mesonotum light olivaceous to golden brown with five darker dorsal and a broad lateral, stripe; mesopleura with large brown spot; scutellum with two discal spots. Abdomen gray with four series of large brown, subopaque spots, more or less coalescing on bases of segments; marginal bristles with basal brown dots; ventral lobes spotted.

Frons quadrate; orbits parallel. Face three-fourths as broad as vertex, slightly longer than broad, with two or three distinct bristles on lower fourth of profile; in profile, vertical, slightly visible above. Cheeks as broad as length of third antennal joint. Antennal spine minute; third joint slightly conical, rounded apically; arista with about nine hairs. Scutellum flat, trapezoidal, slightly rounded apically. Abdomen ovate, rather long; segments subequal; fifth convex, triangular. Middle femora and tibiae of male strongly ciliate. Wings long; second costal section twice as long as third. Length.—3 to 4 mm.

Lectotype.—♀; Vieques Island, Porto Rico, February, 1899, (A. Busck), [U. S. Nat. Mus. Type No. 4376]. (Present selection from cotypic series). *Paratypes*.—2 ♂; topotypical; 1 ♂,

Arroyo, Porto Rico, February, 1899, (A. Busck); 1 ♂, Bayamon, Porto Rico, January, 1899, (A. Busck); 1 ♀, Utuado, Porto Rico, January, 1899, (A. Busck).

Specimens Examined.—19 ♂, 22 ♀.

SAN DOMINGO: 1 ♀, [Kans.].

PORTO RICO: Arroyo, II, 1899, (A. Busck), 1 ♂, [U. S. N. M.]. Bayamon, I, 1899, (A. Busck), 1 ♂, [U. S. N. M.]. Utuado, I, 1899, (A. Busck), 1 ♀, [U. S. N. M.]. Vieques Island, II, 1899, (A. Busck), 2 ♂, 1 ♀, [U. S. N. M.].

MARTINIQUE, WEST INDIES: VII, 27, (A. Busck), 3 ♀, [U. S. N. M.].

COSTA RICA: Alajuela, 3100 ft. alt., IX, 8, 1909, (sweeping over brook), 1 ♀. Cachi, near Rio Reventazon, 3450 ft. alt., III, 4, 1910, 1 ♂, 2 ♀. Cartago, V, 17, 1909, (along ditch), 2 ♂, 3 ♀; V, 25, 1909, (along ditch), 2 ♂; VII, 4, 1909, 1 ♀; X, 10, 1909, (sweeping over mud), 3 ♂, 2 ♀; X, 27, 1909, 1 ♀; XI, 21, 1909, (sweeping over mud), 1 ♂, 2 ♀; II, 19, 1910, (sweeping over mud), 1 ♂, 1 ♀. Juan Viñas, II, 14, 1910, 1 ♂. Peralta, III, 24, 1910, (sweeping over muddy stream), 2 ♀.

Variations.—The series examined show little variation in comparison to the number examined. The color sometimes becomes more golden and on the frons obscures the darker vittae. The face may be gray and the number of arisal hairs may be increased to twelve.

A female; Puerto Barrios, Guatemala, III, 3 to 14, 1905, (J. S. Hine), [Ohio]; evidently belongs near here. The face, however, is slightly broader with a slight brownish stripe in the middle below. In this respect it is apparently simulating *facialis*.

Synonymy.—There is some possibility of this being *Notiphila striata* Williston, but a few discrepancies are evident upon comparison with the description of that species. The original description of *striata* suggests the present species, except that there is no mention of the frontal vittae, or of the four series of abdominal spots. In these respects *striata* agrees with *erythrocer*a, but differs in the distinctly vittate thorax not possessed by *erythrocer*a.

Var. **pura** new variety

Similar to *virgata* but thorax immaculate.

Type.—♂; Tabernilla, Canal Zone, Panama, April 27, 1907, (A. Busck), [U. S. Nat. Mus., Type No. 20722].

This form suggests *erythrocer*a, but has the middle femora and tibiae ciliate. It is certainly allied to *virgata*, of which I prefer to consider it a variety.

Variation.—A male bearing the same data as the type, differs in having the series of facial bristles more extended and the arisal hairs seven in number. There is also faint indications of thoracic maculation. A possible intergrade may invalidate this variety.

I have also a male, labeled "D. C., 8. 19. 99", [U. S. N. M.], which is not typical, but I hesitate to recognize it as a distinct species or variety upon such meager and uncertain data. It seems to simulate this variety, but the thorax shows faint maculation, the facial bristles are weaker, in more extended series, and the fore tibiae and tarsi are entirely infusate.

***Notiphila vittata* Loew**

1862. *Notiphila vittata* Loew, Mon. Dipt. N. Am., i, 136.

This and the following species form a small group which I have not otherwise recognized. Although typical of the *cinerea* group, these species have the male abdomen elongate, arched and cylindrical, and sunken on the dorsum; not flattened and ovate as is usual with the other species. The females, on the other hand, are very similar, in fact they are difficult to separate from those of *virgata*. In the latter species, however, the face is broader, the abdominal spots are more isolated, with less tendency to coalesce into bands; the lateral stripe of the mesonotum is broad, completely traversing the sutural depression and extending to the supra-alar region.

My specimens agree so well with the original description that I have no doubt of the determination.

Description.—Similar to *virgata* in color and general markings. Frons not vittate; mesonotum faintly and narrowly vittate medianly, but with a broad lateral stripe extending over the sutural depression to the supra-alar region; mesopleura also vittate above and below; scutellum with lateral margins brown. Abdomen with four series of spots of which the median pair are elongate, generally attaining apices of segments, sometimes narrowly connected basally with the lateral spots on segments two, three and five; ventral lobes also with series of spots.

Structurally similar to *nudipes*, but the bristles of legs normal and well developed. Length.—3 mm.

Type.—♀; Middle States, [Mus. Comp. Zool.].

Specimens Examined.—3 ♂, 7 ♀.

NEW JERSEY: Cape May, VI, 7, 1914, (H. S. Harbeck), 1 ♀, [Harbeck].

MARYLAND: Pope's Creek, V, 22, 1896, 1 ♂, 2 ♀, [A. N. S. P. and H. N. M.].

DISTRICT OF COLUMBIA: VIII, 19, 1899, 1 ♀, [Ohio].

OHIO: Sandusky, VI, 30, 1900, 3 ♀, [Ohio]; VII, 1914, 1 ♀, [Ohio]. Wauseon, VIII, 25, 1902, 1 ♂, 1 ♀, [Ohio].

ILLINOIS: Havana, Thompson's Lake, IX, 1, 1910, (Sandy beach), 1 ♀, [Ill.].

MISSOURI: Columbia, V, 26 to VI, 8, 1906, (C. R. Crosby), 1 ♂, [Corn. U.].

Variations.—The female from Cape May, New Jersey, has the third antennal joint black and the mesonotum distinctly vittate.

***Notiphila nudipes* new species**

?1862. *Notiphila bella* Loew, Mon. Dipt. N. Am., i, 135.

This species has both sexes peculiar in that the legs are nearly destitute of, or with very poorly developed, bristles. The species is also distinctive in the general cinereous tinge overcasting the entire insect, excepting, of course, the brown markings and the facial color.

It is separated from *vittata* by the undeveloped leg bristles, stouter femora and more triangularly shaped head in the male. The leg bristles are reduced to setulae, which are evenly developed over all surfaces, not longer in certain places than in others.

Description.—Black; palpi, sometimes third antennal joint except apical margin, halteres, apices of femora, broad bases and narrow apices of tibiae and tarsi, tawny or yellow; tarsal fascicle pale.

Opaque, olive gray pruinose. Frons blackish, with median area and especially orbits lighter. Face yellow. Mesonotum rarely vittate medianly, but with broad lateral stripe, including presutural and supra-alar bristles, and another intra-alar stripe continuous on lateral scutellar margins, brown; mesopleura sometimes with stripe above. Abdomen of male with a pair of large, brown triangles on segments three to five, attaining apical margins of segments medianly, and attenuating laterally; of female with emarginated basal bands dilating medianly; second segment with two to four rounded, isolated spots.

Frons subhorizontal, well protruding at antennae, flattened, longer than broad; orbits parallel. Face as broad as frons, in profile straight and retreating; carina more prominent than orbits; bristles weak. Cheeks hardly as broad as length of third antennal joint; lower occiput very conspicuous. Spine of second antennal joint minute; third, broad apically; arista with seven to eight hairs. Scutellum broadly truncate, flat. Abdomen elongate, cylindrical, arcuate, sunken on dorsum of segments two to four; lateral margins rounded; segment five subconical, broadly truncated, much longer than four. Legs stout, all bristles reduced to setulae or are wanting; middle femora of male sulcate, cilia very short, erect on their tibiae. Length.—3 to 4 mm.

Holotype.—♂; Woodbury, New Jersey, VI, 7, 1896, (C. W. Johnson), [A. N. S. P. No. 6110]. *Paratypes*.—2 ♂; topotypical.

Specimens Examined.—5 ♂, 3 ♀.

NEW JERSEY: Manahawkin, V, 30, 1910, (H. S. Harbeck), 3 ♀, [Harbeck]. Woodbury, VI, 7, 1897, (C. W. Johnson), 3 ♂, [A. N. S. P. and H. N. M.].

OHIO: Akron, VI, 23, 3 ♂, [Ohio].

Notes.—Of the specimens examined, the males have the third antennal joint mostly yellow and the pleural markings obsolete.

Although the series I have is small it is noticed that there are no specimens of both sexes from the same locality. The only females I have seen are the three from Manahawkin, New Jersey. Before seeing these I could not satisfactorily characterize the species except in the males, and had about concluded that the females were inseparable from those of *vittata*. As soon as the Manahawkin specimens were examined the stout, weakly setulose legs at once indicated their relationship.

Synonymy.—I suspect this to be *N. bella* of Loew, mainly on account of the ash gray color and the broad mesonotal stripes, but it is strange that Loew does not mention the peculiar development of the abdomen. On the other hand my specimens have only a spot on the upper part of the pleura, and the abdominal spots are arranged in two series or the lateral ones are short and small.

***Notiphila loewi* new name**

?1862. *Notiphila unicolor* Loew, Mon. Dipt. N. Am., i, 137, (nec Walker, 1860).

This species begins a group with non-vittate thorax, and hair-like facial bristles in more extended series. The abdominal markings are reduced to two median series of triangular spots, or the abdomen may be immaculate. The present species has the fore tibiae and tarsi black and the middle and hind ones yellow. The cilia of the male middle tibiae is not well developed, the bristles or hairs being more recumbent. Their femora, however, are distinctly and densely ciliate.

Description.—♂. Black; base of third antennal joint, palpi, halteres, knees, tibiae and tarsi except median ring on hind tibiae and apical joint of tarsi, tawny or yellow. Fore tibiae and tarsi, black. Tarsal fascicle black. Wings brownish.

Opaque, light olivaceous with ochreous tinge including femora; sometimes dorsal surfaces darker to brownish, and pleura and metanotum lighter. Frons darker with light orbits; vittae indistinct. Face and cheeks yellow or ochreous to whitish. Mesonotum faintly vittate; mesopleura with small spot or thorax entirely immaculate. Abdomen with a median pair of brownish triangular spots on segments; sometimes these extend to lateral margin, are limited to a pair on third segment only, or are entirely wanting.

Frons subquadrate; orbits slightly converging. Face three-fourths as broad as vertex, one-fourth longer than broad, with shallow foveae and a weak,

sharp carina; with three to four weak bristly hairs on lower half of profile; profile convex, slightly more prominent than orbits. Cheeks as broad as length of third antennal joint. Antennal spine weak; third joint broad apically; arista with seven to eight hairs. Thoracic bristles and setulae distinct, normal. Scutellum flat, trapezoidal. Abdomen ovate; segments consecutively increasing in length; fifth triangular, acute, convex. Middle femora distinctly and densely ciliate, especially apical half; tibial cilia appressed. Wings long; second costal section twice as long as third. Length.—3.2 to 3.5 mm.

♀. Similar but frons somewhat faintly vittate; bristles of face and especially of abdomen stronger.

Holotype.—♂; Sandusky, Cedar Point, Ohio, July 16, 1902, [Ohio]. *Paratypes*.—1 ♂, 9 ♀; topotypical.

Specimens Examined.—6 ♂ 12 ♀.

MASSACHUSETTS: Eastham, VI, 27, 1904, (C. W. Johnson), 1 ♂, [B. S. N. H.]. Nantucket, VII, 20, 1910, (G. M. Allen), 1 ♂, 2 ♀, [B. S. N. H.].

OHIO: Sandusky, Cedar Point, VII, 5, 1902, 2 ♂, [Ohio]; VII, 9, 1902, 1 ♀, [Ohio]; VII, 16, 1902, 2 ♂, 9 ♀, [Ohio and Kans.].

Variations.—The specimens with immaculate abdomen surely belong here, as there is much variation in the extent of the abdominal markings in the series examined; these sometimes reduced to only a pair on the third segment, or, as in the Nantucket specimens, the abdomen is wholly immaculate. It is not probable that the absence or presence of spots alone is of specific importance.

I have also a female; Mt. Constitution, Orcas Island, Washington, VII, 7, 1905, (J. M. Aldrich), [Aldrich]; which is similar to those in the above series with the following exceptions: The dark abdominal markings are more developed, attaining the apices of the segments, and on the third also attaining the lateral margins; the frons and face are somewhat broader and the third costal section is longer. The discovery of the male of this form will probably reveal some specific differences, but for the present I will place this individual here.

Synonymy.—The above quoted synonymy, I think, is correct, but Loew's name cannot stand and being uncertain as to the correct identification of *unicolor* Loew, I am supplying a new species for my series.

Notiphila floridensis new species

This form is similar in many respects to *loewi*, and I am not sure that it is a good species, but it will probably deserve sub-specific recognition.

Description.—Similar to *loewi*. Frontal orbits slightly converging. Face white, sericeous, with three to four distinct bristles on lower half of profile; profile concaved above. Cheeks twice as broad as third antennal joint. Abdomen gray, contrasting with the ochreous mesonotum; segments three and four with median pairs of triangular spots. All tibiae and tarsi yellow, but fore tibiae sometimes discolored medianly; cilia of middle tibiae of male sub-erect. Wings grayish. Length.—3.2 mm.

Holotype.—♂; South Florida, (Robertson), [U. S. Nat. Mus. No. 20723]. *Paratype*.—1 ♀; topotypical.

Notiphila biseriata new species

In this we have another form similar to *loewi* but differing in the characters given below.

Description.—Similar to *loewi* but abdomen broader, more rounded and the spots large, not triangular, with little or no tendency to broaden along bases of segments. General color wholly olivaceous with frons dark and face yellow. Mesonotum and pleura immaculate. Middle tibiae at apices and hind tibiae except extreme bases, black, as are also the apices of their tarsi.

Facial bristles noticeably more separated, so that the series extends higher towards antennae. Antennal arista with eight to nine hairs. Ciliae of middle tibiae of male more erect and of their femora more dense. Wings, especially second vein much longer, with second costal section four times as long as third. Length.—4 mm.

Holotype.—♂; Sandusky, Ohio. [Ohio Univ. Coll.].

A female; Drayton Island, Florida, V, 9, 1894; labeled "N. unicolor Lw.," which I have seen in the U. S. National Museum collection, may belong here, but I have not compared specimens.

Notiphila cognata new species

This species is unique in having the tarsal fascicle yellow. If this character continues to hold, as it has done in the other species, the present species can thus be distinguished from all others belonging to this group. Unfortunately, I have seen only the type of this form. The general habitus is similar to *biseriata* and the species probably belongs near it. The abdominal markings may, in an extended series, be found to be arranged in four series of spots, as the type has suggestions of lateral spots.

This form seems to be the nearest relative of the European *cinerea* Fallen, we have in America. I have seen European specimens of *cinerea*.

Description.—Black; base of third antennal joint, halteres and knees, and all tibiae and tarsi, including tarsal fascicle, yellow. Wings clear hyaline.

Opaque. Frons blackish olivaceous with orbits narrowly lighter. Face and cheeks whitish, sericeous. Occiput, pleura, abdomen and femora, grayish olivaceous. Mesonotum and scutellum olivaceous, faintly if at all vittate.

Frons broad as long, orbits converging. Face two-thirds as broad as vertex, twice as long as broad; foveae weak in profile, scarcely visible above; bristles hair-like in series extending above middle of profile. Cheeks twice as broad as third antennal joint. Antennal spine minute; third joint broadly rounded apically; arista with six hairs. Mesonotal bristles strong but setulae weak. Scutellum flat, rounded apically. Abdomen ovate, segments subequal. Middle femora ciliate and cilia of their tibiae erect. Wings long; second costal section twice as long as third. Length.—3.5 mm.

Holotype.—♂; Manahawkin, New Jersey, V, 30, 1910, (H. S. Harbeck), [A. N. S. P. No. 6111].

The type specimen was determined by Coquillett as *N. unicolor* Lw.

Notiphila fulvimana new species

This species, represented in my material by the typical pair alone, is rather unique and occupies a somewhat isolated position. It has a small extensor near the apex of the middle tibiae of the male, thus suggesting a relationship to the species of the subgenus *Agrolimna*. The maculation of the abdomen is characteristic, and the species, as at present known, is distinguished by this. The ciliation of the middle femora is weakly developed and scarcely distinguishable. The systematic position of the species is rather difficult to determine with so little material, but I think it should belong here, near *Agrolimna*.

Description.—♂. Black; base of third antennal joint, halteres, apices of femora, all tibiae and tarsi, and tarsal fascicle, black; wings tawny or yellow, uniformly hyaline with yellow veins.

Opaque; yellowish inclined to gray, or olive-lake, not much lighter below. Frontal vittae darker; orbits and face more yellowish. No brownish markings except on the abdomen. These are in the form of a pair of concaved triangles on segments three to four, with their extremities attaining the apical and lateral margins of the segments; segment five has only a median pair of elongated spots. The median stripe well marked. Femora thinly coated with gray.

Frons as broad as long, in profile convex; orbits parallel. Face nearly as broad as vertex, longer than broad, in profile convex; foveae and carina distinct; parafacials narrow; bristles hair-like, four or more on lower third or half. Cheeks as broad as length of third antennal joint. Second antennal

spine short; third joint ovate; arista with eight hairs. Abdomen broad; segment four much longer than three; five much shorter; genital segment well developed. Legs sparsely bristled, with a suggestion of a fourth extensor bristle on middle tibiae. Wings long; second costal section two or three times as long as third. Length.—3.5 to 4 mm.

♀. Similar, but only three extensors on middle tibiae.

Holotype.—♂; San Diego de los Banos, Cuba, [U. S. N. M. No. 20725]. *Paratype*.—♀; topotypical.

Agrollimna new subgenus

This subgenus is proposed for the reception of those species having the facial bristles hair-like, in series extending well above the middle of the facial profile, and the middle tibiae furnished with four extensor bristles, i. e., the preapical extensor present and well developed. The species falling here, at least those known to the author, also have the palpi and antennae generally black; middle femora and tibiae never ciliate. The abdominal markings are generally in the form of bands which are sometimes dilated medianly, or, may be limited to two median series of triangular spots. However, the bands do not break up into four spots as is often the case with the species of the previous subgenus.

The present subgenus contains several well defined groups which I think should be recognized. The type species of this subgenus is *Notiphila scalaris* Loew.

The *scalaris*-group

It is very probable that the European *uliginosa* Haliday, will come within this group, in which case the group name, if thought desirable, can be changed to conform. I have not seen that species, but the fact that it possesses the tibial character of four extensors at once includes it within this subgenus. It contains a larger number of forms than either of the other two groups. The species as included here are in some cases unsatisfactorily separated, and perhaps a few of them may prove to be synonyms.

The characteristics of this group may be considered negatively. The abdomen of the male is normal, not armed apically; frons and mesonotum not vittate. In other words it is the residual group of this subgenus and may ultimately prove to be complex.

Notiphila scalaris Loew

1862. *Notiphila scalaris* Loew, Mon. Dipt. N. Am., i, 134.

In this species we have the typical North American form belonging to the division of this group, possessing black antennae and palpi. It is distinguished from its allies by the obscure frontal vittae and the broad black abdominal bands. These bands are shining and seldom dilated medianly or noticeably attenuated laterally, but continue over on the ventral lobes in their full width. From *occidentalis* it may be difficult to separate the present species when the fauna from westward of the Mississippi Valley, especially that of the eastern slope of the Rocky Mountains, is more thoroughly worked over in this genus.

I think my determination of this species is correct.

Description.—Black; middle and hind tarsi tawny; fore tarsi brown or black, only tawny at the articulations; tarsal fascicle yellow, rarely black. Halteres yellow.

Opaque. Frons generally unicolorous blackish, or orbits and triangle somewhat gray or yellowish, rarely with broad orbits contrasting with black vittae; lunule yellowish white. Face golden to grayish yellow; orbits scarcely lighter. Cheeks concolorous. Mesonotum light brown to grayish brown, only faintly and inconspicuously vittate; mesopleura with distinct brown horizontal stripe or spot. Abdomen gray to light brown, segments two to four with broad shining brown or black basal bands, which are rarely attenuated laterally or attaining apical margins at middle, generally of equal width to lateral margins and extending over on the ventral lobes; segment two rarely immaculate. Apical segment of male entirely shining black or brown, or, with lateral gray spots, but rarely with a median gray stripe. Wings brownish with yellow veins, which are more or less clouded with fuscous or yellow, especially the post-cross vein.

Eyes vertical, attenuated below. Frons as long as broad; orbits parallel or converging. Face two-thirds as broad as vertex, twice as long as broad; carina obtuse or in some aspects appearing sharp, visible in profile, especially of female; bristles hair-like, in series complete to foveae. Cheeks as broad as length of third antennal joint. Antennal spine hardly one-half as long as third joint; arista with nine or more hairs. Middle femora with two, rarely three, bristles on the apical half of anterior surface. Length.—3.5 to 4 mm.

Types.—♂, ♀; Middle States, (Osten Sacken), [Mus. Comp. Zool.]

Specimens Examined.—124 ♂ and ♀.

CANADA: Sandford, Ontario, VI, 1906, (C. R. Crosby), 3 ♀, [C. U.].
Toronto, Ontario, VII, 4, 1913, (M. C. VanDuzee), 1 ♀, [Van D.].

NEW HAMPSHIRE: Franconia, (A. T. Slosson), 1 ♂, [U. S. N. M.].

MASSACHUSETTS: Blue Hills, VI, 6, (C. W. Johnson), 1 ♀, [B. S. N. H.]. Hyannis Point, VII, 4, (C. W. Johnson), 1 ♀, [B. S. N. H.].

NEW YORK: (E. B. Southwick), 1 ♂, 1 ♀, [U. S. N. M.]. Beaverkill, Sullivan County, VIII, 5, 1909, (E. T. Cresson, Jr.), 1 ♀, [A. N. S. P.]. Caroline to Harford, Tompkins County, VI, 15, 1904, 1 ♂, [C. U.]. Dryden Lake, Tompkins County, VI, 16, 1904, 10 ♂, 8 ♀, [C. U.]. Ellis to Slater-ville, Tompkins County, VI, 13, 1904, 2 ♀, [C. U.]. Gowanda, Cattaraugus County, VI, 15, 1913, (M. C. Van Duzee), 1 ♀, [Van D.]. McLean, Tompkins County, VII, 2 to 3, 1904, 4 ♂, 2 ♀, [C. U.]. Malloryville, Tompkins County, VI, 18 to 20, 1904, 1 ♂, [C. U.]. Mud Creek, Tompkins County, VII, 17 to 18, 1904, 4 ♂, 9 ♀, [C. U.]. Slaterville to Caroline, Tompkins County, VI, 14, 1904, 2 ♂, 6 ♀, [C. U.]. Woodwardia Bog, Tompkins County, 1 ♂, 3 ♀, [C. U.].

NEW JERSEY: Clementon, V, 30, 1905, (H. S. Harbeck), 1, [Harbeck]. Manahawkin, IX, 5, 1910, (H. S. Harbeck) 1, [Harbeck]. Point Pleasant, VI, 21, 1914, (H. S. Harbeck), 1, [Harbeck].

PENNSYLVANIA: Germantown, VIII, 5, 1905, (H. S. Harbeck), 2, [Harbeck]. McConnellsburg, Fulton County, VI, 4, 1905, (Stone), 1 ♀, 1 ♀, [A. N. S. P.]. Philadelphia, V, 30, 1891, (C. W. Johnson), 4 ♀, [H. N. M.]. Pocono Lake, VII, 25, 1912, (H. S. Harbeck), 3, [Harbeck]. Roxborough, VI, 11, 1911, (H. S. Harbeck), 8, [Harbeck].

MARYLAND: College Park, V, 15, 1913, (F. Knab), 1 ♀, [U. S. N. M.].

DISTRICT OF COLUMBIA: Rock Creek, VI, 15, 1913, (R. C. Shannon), 1 ♂, [U. S. N. M.].

WEST VIRGINIA: Fairmont, VI, 22, 1908, (E. T. Cresson, Jr.), 1 ♂, 1 ♀, [A. N. S. P.].

OHIO: Akron, VI, 19, 1 ♂, 3 ♀, [Ohio]. Columbus, V, 18, 4 ♂, 1 ♀, [Ohio]. Hawkins, Summit County, VI, 27, 1902, 1 ♂, 3 ♀, [Ohio]. Hinckley, Medina County, VI, 20, 1903, 5 ♂, 10 ♀, [Ohio]. Sandusky, VI, 30, 1900, 2 ♀, [Ohio]; VII, 1914, 1 ♀. Cedar Point, Sandusky, VI, 8, 1902, 1 ♀; VII, 1, 1904, 1 ♂ [all Ohio].

ILLINOIS: Algonquin, 2 ♀, [U. S. N. M.].

Notes.—This we may call the typical species of the group, having the face yellow, rarely gray, and the veins of the wings also yellow. The abdominal design is very pronounced when the median stripe and the apical margins are gray instead of yellow, and the dark bands very shining.

Notiphila atripes new species

Allied to *scalaris* but hardly synonymous. It may be distinguished by the elongated abdomen of the male and the black tarsi.

Description of Male.—Similar to *scalaris*. Black; halteres yellow. Frontal vittae black, distinct. Arista with eight hairs. Thorax immaculate or mesopleura slightly stained. Abdominal markings subopaque, broad, leaving narrow median stripe and apical margins of segments gray; segment five entirely shining. Abdomen unusually narrowed and elongate. Length.—3 to 5 mm.

♀. Similar but segment five with median stripe. The abdomen also longer than usual.

Holotype.—♂; Beverly, Massachusetts, VI, 15, 1875, (Burgess), [U. S. N. M. No. 20726]. *Paratypes*.—2 ♀; topotypical.

***Notiphila occidentalis* new species**

?1868. *Notiphila quadrisetosa* Thomson, Kong. Svensk. F. Eugenie Resa, Dipt., 594.

This species although very similar to *scalaris* is not identical. However it may prove to be only a subspecies. The difference is not well marked and is rather difficult to describe.

Description.—Similar to *scalaris* Loew, but more robust, darker and tarsi sometimes entirely black. Frons more uniformly blackened; the lighter, grayish orbits and triangle indistinct or obliterated. Face broader in proportion to its length, being nearly as broad as long, bluish white to yellowish gray; parafacials wider and lighter. Cheeks much broader. Mesonotum uniformly dark olivaceous, if at all only faintly and narrowly vittate; mesopleura faintly marked. The brown abdominal bands shining and generally poorly defined. Middle femora generally with three stout bristles on anterior surface near apex. Wings brownish or blackish, in some aspects faintly opalescent; all veins blackish with last section of fourth noticeably weaker. Length.—3.5 to 4.

Holotype.—♂; Alameda (salt marshes), California, May 5, 1908, (E. T. Cresson, Jr.), [A. N. S. P. No. 6112]. *Paratypes*.—2 ♀; topotypical.

Specimens Examined.—3 ♂, 10 ♀.

IDAHO, (all J. M. Aldrich), [all Aldrich]: Grangeville, VI, 27, 1907, 1 ♀. Juliaetta, 2 ♀. Moscow, 1 ♀. Potlatch, VI, 20, 1907, 1 ♀. White Bird, VII, 3, 1907, 1 ♀.

NEVADA: Wells, V, 6, 1915, (M. C. VanDuzee), 1 ♂, [VanDuzee].

OREGON: Beaver Creek, Newport, 1 ♀, [Aldrich].

CALIFORNIA: Alameda (salt marshes), V, 5, 1908, 1 ♂, (E. T. Cresson, Jr.), 1 ♂, [A. N. S. P.]; V, 26, 1915, (M. C. VanDuzee), 3 ♀, [VanDuzee]. Berkeley, V, 12, 1915, (M. C. VanDuzee), 1 ♀, [VanDuzee]. Berkeley Hills, Alameda County, IV, 11, 1908, (E. T. Cresson, Jr.), 1 ♂, 2 ♀, [A. N. S. P.]. Palo Alto (salt marshes), IV, 26, 1906, 1 ♀, [Aldrich].

Variation.—A female, labeled "12 mi. N. W. of Lusk, Wyo. July 1895, U of K. Lot 431," [Kans.], may belong to a distinct species or subspecies, or is an intergrade. The frons is vittate; the face yellow, slightly narrower; all tarsi entirely black.

Synonymy.—The above synonymy is probably correct. This species is apparently the most abundant occurring on the Pacific coast region that agrees with Thomson's description, but it is

not the only one in my material which will. Until the types are compared or examined by a competent student, I hesitate to use Thomson's name.

Var. **minima** new variety

Smaller than the typical form (2.5 mm.). Thorax uniformly greenish gray without any suggestion of stripes or spots on the dorsum or pleura. Abdominal dark bands obscured, but not attenuating laterally; bases of tarsi pale; second costal section twice as long as third.

Holotype.—♂; Jemez Mountains, New Mexico, IX, 10, 1914, (J. Woodgate), [A. N. S. P. No. 6108]. *Paratype*.—1 ♂; topotypical.

I cannot consider this more than a variety of the common western species.

Notiphila atrisetis new species

Similar to *macrochaeta* both in color and structure, differing in the tarsal fascicle of the male below normal in length, minute. Furthermore the fore tarsi are entirely black and the dark abdominal bands broader and more shining, especially in the females, thus suggesting *occidentalis*. This form also averages slightly larger than *macrochaeta*. Length.—3.5 to 4 mm.

Holotype.—♂; Desert Edge, San Diego County, California, April 17, 1915, (M. C. VanDuzee), [A. N. S. P. No. 6115]. *Paratypes*.—1 ♂, 3 ♀; topotypical.

This form is likely to be confused with *occidentalis* and *olivacea*, if the color of the tarsal fascicle is not given attention. The females are difficult to separate from those of *macrochaeta*, but the dark abdominal bands seem to be broader and more shining in this species. Considering the larger size and general appearance, besides the characters mentioned above, I cannot treat this form as a variety of any known species.

A male and female from Great Salt Lake, Utah, VI, 8, 1915, (M. C. VanDuzee), also seem to belong here. They apparently are identical with the typical series.

Notiphila olivacea new species

This and the following species belong to a division of the *scalaris* group differing from that including *scalaris* in being more brownish or greenish, the abdominal bands less developed and the frons and mesonotum more noticeably vittate. This species is likely to be confused with some of the forms of *scalaris*, but I cannot consider it synonymous, although its limits are not satisfactorily established at present. The vittate frons, distinct when

seen from above, the olivaceous abdomen with the more opaque bands becoming narrower laterally, and the yellow tarsi, especially of the middle and hind legs, are the characters that seem to be of most value. The species seems to be very similar to the European *uliginosa* Haliday, which I have not seen, but is probably distinct. The females are difficult to separate from those of *macrochaeta*, so the description and notes under that species should be consulted.

Description.—♂. Black; halteres, base of wings, middle and hind tarsi, yellow or tawny. Tarsal fascicle yellow. Wings hyaline with yellow or brownish tinge and yellow veins.

Opaque: ochreous or olivaceous above to cinereous below. The two broad frontal vittae and dash below ocellus, blackish. Face golden yellow, sericeous; cheeks and occiput gray. Mesonotum, scutellum and pleura immaculate or with faint brown markings. Abdominal segments three to four with narrow opaque or subopaque brown basal bands, which are slightly dilated medianly and attenuated laterally, rarely attaining apices of segments; segment five shining black with median and lateral gray stripe. Femora and tibiae grayish. Length.—4 to 5 mm.

Holotype.—♂; Sandusky, Ohio, July, 1914, [Ohio Univ. Coll.].

Paratypes.—2 ♂, 6 ♀; topotypical.

Specimens Examined.—13 ♂, 21 ♀.

CANADA: Toronto, Ontario, VII, 4, 1913, (M. C. VanDuzee), 2 ♂, 3 ♀, [VanDuzee].

MASSACHUSETTS: Barnstable, VII, 9, 1 ♂, [B. S. N. H.]. Nantucket, VII, 20, 1910, 2 ♂, [B. S. N. H.]. Provincetown, VI, 24, 1904, (C. W. Johnson), 3 ♂, [B. S. N. H.].

NEW YORK: VI, 23, 1893, (E. B. Southwick), 2 ♀, [U. S. N. M.]. Ithaca, 1 ♀, [C. U.]; VII, 16, 1905, 1 ♀, [Johnson].

NEW JERSEY: Cape May, VI, 17, 1914, (H. S. Harbeck), 1 ♀, [Harbeck]. Manahawkin, VIII, 3, 1912, (H. S. Harbeck), 1 ♀, [Harbeck]. West Orange, VI, 1 ♀, [Harbeck].

OHIO: Sandusky, VI, 30, 1 ♀, [Ohio]; VII, 1914, 3 ♂, 6 ♀, [Ohio].

ILLINOIS: Havana, Thompson's Lake, IX, 1, 1910, (sandy beach), 1 ♂, [Ill.]. Payette, VIII, 27, 1907, (E. G. Titus) 1 ♂, [Johnson].

?TEXAS: Galveston, V, (F. H. Snow), 2 ♀, [Kans.].

?MEXICO: Guadalajara, VI, 24, 1907, (McClendon), 1 ♀, [A. N. S. P.].

Variations.—A female, "12 m. N. W. of Lusk, Wyoming, Jul. 1895," [Kans.], may not belong here and so is not included in the above list. It is more uniformly grayish with abdominal spots nearly obsolete. The Mexican specimen may prove to belong to another species, but I cannot differentiate it from the others.

Note.—In working over this species preparatory to submitting this paper for publication, it was discovered that I had labeled the two specimens from Texas as *olivacea* whereas they may be *macrochaeta*. These have been returned to the University of Kansas and anyone working over that collection in this group should see if my labels are intact and correct the determination if wrong.

Var. **aenigma** new variety

Very similar to *olivacea* and doubtfully distinct, but probably deserving varietal recognition. The salient characters are the maculation of the mesopleura and the more or less distinct vitta-tion of the mesonotum.

Description.—Similar to *olivacea* with fore tarsi tawny; wing veins more or less faintly clouded. Face pale yellow; mesonotum with three or five more or less distinct dorsal, and a broad distinct lateral, vittae, brown; mesopleura with distinct brown spot or band. Abdominal brown bands dilated medianly and attaining lateral margins.

Holotype.—♂; Seattle, Washington, VII, 15, 1901, [A. N. S. P. No. 6113].

Variations.—The following specimens I have included here with more or less doubt, and it is not improbable than some may represent other varieties. These being females may account for the variations from the type.

Three females: Mt. Constitution, Orcas Island, Washington, July 7, 1905, [Aldrich]. These are stouter in build, the color design more distinct, face broader and the arista with fourteen hairs. The scutellum is smaller, the brown abdominal bands rather shining, the third costal section shorter and the veins more noticeably clouded.

A female; Elma, New York, August 24, 1913, (M. C. Van-Duzee), [VanDuzee]; has narrower frons and face, the former quadrate. The brown abdominal bands are broad and shining, hardly dilated or attenuated; veins not clouded.

Synonymy.—This may be *decorus* Williston, but I have not seen representatives of that species and therefore will not consider the possibility.

Notiphila macrochaeta Loew

Pl. I, fig. 4.

1878. *Notiphila macrochaeta* Loew, Zeit. f. Ges. Natur., 1878, 192.

In general appearance this species differs little, if at all, from *olivacea*. However, it may be distinguished by the black bristle

in the tarsal fascicle, which in the male is a very long bristle, more than a half as long as the basal joint.

I have not seen the type of this species.

Description.—Similar to *olivacea*. Smaller (3 to 4 mm.); frontal vittae sometimes narrow or may be obscured; arista with eight to ten hairs. Tarsal fascicle with black bristle, which of the male is very long, more than half as long as basal joint of tarsi; of female not longer than the accompanying yellow bristles, but is situated more on the inner than flexor side of the joint, and is sometimes difficult to see. Wings hyaline, clear, not yellow tinged; second costal section twice as long as third.

Type.—♂; Texas, (Belfrage), [Mus. Comp. Zoölogy ?].

Specimens Examined.—4 ♂, 12 ♀.

SOUTH DAKOTA: Brookings, 1 ♂, 1 ♀, [Aldrich].

KANSAS: Clay County, 1 ♀, [C. U.].

TEXAS: Austin?, X, 1899, 1 ♂, [Wash.]. Plano, (E. S. Tucker; at night), 1 ♀, [Kans.]. Galveston, V, (F. H. Snow), 1 ♂, 3 ♀, [Kans.].

ARIZONA: Bill Williams Fork, VIII, (F. H. Snow), 1 ♀, [Kans.].

CALIFORNIA: Coalinga, Fresno County, VI, 1 to 3, 1907, (J. C. Bradley), 1 ♀, [C. U.]. Mesa Grande, Russian River, IX, 30, 1906, (J. C. Bradley), 2 ♀, [C. U.]. Stanford University, X, 1 ♂, 1 ♀, [S. U.]. Visalia, (Culbertson), 1 ♀, [Aldrich].

The species seems to be limited to the states west of the Mississippi River.

The *pulchrifrons*-group.

A seemingly well-defined group, although based primarily on the color pattern, which consists of distinct frontal and mesonotal stripes. Those of the frons, especially, are sometimes velvety black, contrasting beautifully with the gray or yellowish tinged orbits and triangle. I know only the following three species, which are not entirely satisfactory, and the study of more material may reduce these to two or even one. The group may then prove to be untenable.

Notiphila pulchrifrons Loew

1878. *Notiphila pulchrifrons* Loew, Berl., Ent. Zeit., xvi, 102 (Cent. x, 84).

This species, although not so distinctly marked as the others, however, possesses the group characters. It is readily distinguished from the others by the third antennal joint, middle and hind tibiae being yellowish; also by the vittation which is more subdued, not so intensely black on the frons, and the abdominal markings are sometimes reduced to two series of spots.

I do not doubt my determination of this species.

Description.—Black; Antennae especially third joint, palpi, halteres, fore coxae, bases and apices of middle and hind tibiae, and their tarsi except apices, yellow; fore tibiae and tarsi, brown, sometimes yellow; post tarsal fascicle yellow. Wings yellowish hyaline, with yellow veins.

Opaque, olive gray to yellow on head. Frons with two broad, obscured vittae and a dash below ocellus, black. Face sericeous, grayish to yellowish or golden, sometimes with two dark stripes. Mesonotum with brown vittae as follows: one narrow median, bifurcated posteriorly and joining the broader dorso-centrals and then continuing on the scutellum; a post intra-alar and another containing the presutural and supra-alar bristles, interrupted at suture; mesopleura at most with a small spot. Abdomen gray or yellowish; bases of segments broadly brown or with only a pair of triangular spots not attaining their apices. Femora gray.

Frons quadrate, orbits parallel or slightly converging; orbital bristles minute. Face one-half as broad as vertex, twice as long as broad, in profile convex below; foveae long and deep with carina rounded; para-facials narrow, concentric. Cheeks one-half as long as third antennal joint. Antennae short with distinct spine; arista with ten to twelve hairs. Scutellum flat, broadly truncate. Second costal section of wing nearly twice as long as third. Length.—2.5 to 3 mm.

Type.—♂; Texas (Belfrage), [Museum of Comparative Zoölogy Coll.]

Specimens Examined.—9 ♂, 15 ♀.

TEXAS: Austin, X, 20, 1 ♀, [Wash.]. Waco, (Belfrage), 1 ♂, 1 ♀, [U. S. N. M.].

ARIZONA: Bill Williams Fork, VIII, (F. H. Snow), 4 ♂, 8 ♀, [Kans.]. Oak Creek Canyon, 6000 ft. alt., VIII, (F. H. Snow), 1 ♀, [Kans.].

CALIFORNIA: Bakersfield, Kern County, IX, 9, 1898, 1 ♂, 1 ♀, [Cal.]. Los Angeles, V, 1, 1915, (M. C. VanDuzee), 1 ♂, [VanDuzee]. San Diego County, desert edge, IV, 17, 1915, (M. C. VanDuzee), 1 ♂, 2 ♀, [VanDuzee]. Three Rivers, (Culbertson), 2 ♂, 1 ♀, [Aldrich]. Visalia, (Culbertson), 1 ♀, [Aldrich].

NEW MEXICO: Jemez Mountains, V, 14, 1914 (S. Woodgate) 1 ♂, 1 ♀, [Harbeck].

***Notiphila frontalis* Coquillett**

1897. *Notiphila pulchrifrons* Williston, Kans. Univ. Quart. vi, 5, (nec Loew, 1872).

1904. *Notiphila frontalis* Coquillett, Proc. Ent. Soc. Wash., vi, 97.

Similar to *N. pulchrifrons* but the design more intense, especially the frontal vittae more distinct and velvety black; in general appearance, a darker species. The broad abdominal bands attaining the apices of the segments medianly, are characteristic. This is one of the prettiest species of the genus, with its velvety black frontal vittae and golden face and orbits.

I have seen the type of this species.

Description.—Meso-frontal triangle brown at vertex, becoming silvery anteriorly; vittae broad, velvety black (dorsal aspect), reaching little beyond base of antennae, leaving narrow orbital lines. Face golden yellow, sometimes with dark stripes; lunule golden. Antennae brownish or black, with base of third joint paler. Mesonotum distinctly vittate; the median and intra-alar vittae more or less coalescing; the lateral one complete over suture. Mesopleura with distinct stripe. Abdominal bands very broad and attaining apices of segments medianly, giving the abdomen the appearance of being dark opaque brown, with a complete mesal stripe and apical angles of segments two to five, gray or yellowish brown; ventral lobes yellowish with a series of large brown dots. Tibiae annulated with black or brown; fore tarsi brown. Length.—2.5 to 4 mm.

Lectotype.—♂; Managua, Nicaragua, (F. C. Baker), [U. S. N. M. No. 7805]. (Present selection.) *Paratypes*.—1 ♂; topotypical. 1 ♀; Granada, Nicaragua, [all U. S. N. M.].

Specimens Examined.—9 ♂, 6 ♀.

NICARAGUA: Managua, (F. C. Baker), 2 ♂, [U. S. N. M.]. Granada, (F. C. Baker), 1 ♀, [U. S. N. M.].

COSTA RICA: Banana River, XI, 9, 1909, (sweeping at upper reservoir, 100 ft. alt.), 1 ♂, 1 ♀. Cartago, V, 17, 1909, (along ditch), 1 ♂, 1 ♀; V, 25, 1909, (along ditch), 1 ♀; VII, 4, 1909, 1 ♂, 1 ♀; V, 10, 1909, (sweeping over mud), 1 ♂; VI, 21, 1909, (sweeping over mud), 1 ♂; II, 19, 1910, (sweeping over mud), 1 ♀. Turrucares, XII, 22, 1909, (sweeping over mud), 2 ♂.

Variation.—The series examined show very little variation, and this is mostly in the extent of the pale coloration of the legs, the tibiae sometimes being almost entirely black.

Synonymy.—No doubt Williston's *pulchrifrons* is this species, although his types were not examined by me. It is strange that Dr. Williston overlooked Loew's name and that Mr. Coquillett did not recognize Williston's species.

Var. *signata* new variety

This form can hardly be considered a distinct species, although in some respects one is inclined to treat it as such. I believe it to be a northern form of *frontalis*.

Description.—Similar to *frontalis* but averaging smaller. In general it is more grayish than yellow. Palpi sometimes with bases dark. Antennae darker; the dark facial vittae more distinct and orbits silvery in contrast. The brown bases of abdominal segments not so broadly occupying the apices at the medial stripe. All tibiae black, or their bases and joints pale. Length.—2 to 2.5 mm.

Holotype.—♂; Thalman, Georgia, April 28, 1911, [Cornell Coll.]. *Paratypes*.—2 ♂, 4 ♀; topotypical.

Specimens Examined.—3 ♂, 5 ♀.

MARYLAND: Chesapeake Beach, VII, 27, 1913, (R. C. Shannon), 1 ♀, [U. S. N. M.].

GEORGIA: Thalman, IV, 28, 1911, 3 ♂, 4 ♀, [Cornell].

The *furcata*-group

This group is distinguished by the character heretofore considered peculiar to the genus *Dichaeta*, that is, the tuberculate spinose development of the fifth abdominal segment of the males. This character is responsible for the author of one of its two species describing it as a *Dichaeta*. I will discuss the generic value of this character under the genus *Dichaeta*, but will say that as the present species, both male and female, are typically Notiphiline in all other respects, I cannot consider the character of generic importance. The females are readily separated from all other species of *Agrolimna* by the yellow palpi and non- or obscurely vittate frons and mesonotum. There are only two species known to me belonging here, and I do not think there are any described representatives in other parts of the world.

Notiphila bispinosa new species

Pl. I, fig. 5.

Similar to *furcata* Coquillett. Antennae yellow. Tibiae of male tawny with median infuscation; of female black with extremities pale. Fifth abdominal segment of male without long tubercle, but the two stout bristles are emitted from the subconical apex of the segment. The face is somewhat more sharply carinate. The two species should not be confused if notice is taken of the color of the antennae.

Holotype.—♂; Barnegat City Junction, New Jersey, August 11, 1910, (H. S. Harbeck), [A. N. S. P. No. 6114]. *Paratype.*—1 ♂; topotypical.

Specimens Examined.—8 ♂, 24 ♀ and 10 ♂ and ♀.

MAINE: Machias, VII, 17, (C. W. Johnson), 3 ♀, [B. S. N. H.].

MASSACHUSETTS: 4 ♂, 5 ♀, [U. S. N. M.]. Eastham, VI, 27, (C. W. Johnson), 2 ♀, [B. S. N. H.]. New Bedford, 1 ♀, [B. S. N. H.]. Woods Hole, VII, 24, (C. W. Johnson), 1 ♂, 2 ♀, [B. S. N. H.].

RHODE ISLAND: Button Wood, VII, 25, 1911, 1 ♀, [B. S. N. H.].

NEW JERSEY: Anglesea, 1 ♀, [A. N. S. P.]. Barnegat City, VII, 11, 1910, (H. S. Harbeck), 5, [Harbeck]. Barnegat City Junction, VIII, 11, 1910, 3, [Harbeck]. Cape May, VI, 4, 1 ♀, [A. N. S. P.]; VI, 22, 2 ♀, [Johnson]; VI, 7, 1914, (H. S. Harbeck), 1, [Harbeck]. Stone Harbor, VIII, 8, 1909, (H. S. Harbeck), 1, [Harbeck].

MARYLAND: Dorchester County, near Lloyds, VII, 10, 1907, (H. S. Barber), 1 ♀, [U. S. N. M.].

FLORIDA: St. Augustine, III, 9, 1 ♂, [A. N. S. P.]; III, 14, 2 ♀, [Johnson]; X, 20, 1 ♀, [Johnson].

LOUISIANA: Cameron, VIII, 14 to 28, 1903, 3 ♂, 1 ♀, [Ohio].

Synonymy.—I have seen specimens of this species which were determined by Coquillett as *Dichaeta carinata* Loew, but these cannot be that species if Loew's description is followed. The antennae here are entirely yellow and I have not seen any suggestions of infuscation.

Notiphila furcata Coquillett

Pl. I, fig. 6.

1902. *Dichaeta furcata* Coquillett, Journ. N. Y. Ent. Soc., x, 182.

?1853. *Notiphila transversa* Walker, Ins. Saund., i, 407.

In this species the antennae are mostly black, especially the second joint. The male has the fifth abdominal segment attenuating into a long cylindrical tubercle, which bears on its apex the two stout bristles.

I have examined the type of this species.

Description.—Black; palpi, base of third antennal joint, knees, and tarsi tawny, (fore tarsi sometimes brownish); halteres whitish. Wings hyaline with pale veins.

Opaque, cinereous to yellowish. Frons faintly vittate with black; orbits white. Face silvery to opaque black, depending upon the angle of vision. Mesonotum faintly and narrowly vittate with brown; mesopleura with brown spot. Bases of abdominal segments broadly subopaque brown, broadly dilated and interrupted medianly except on fifth of male; also with brown dots at bases of the larger bristles; fifth segment of male shining black with a lateral cinereous spot.

Frons convex, hardly broader than long, orbits parallel. Face nearly the width of vertex, more than twice as long as broad; carina weak, not visible in profile; bristles hair-like, in series extending to foveae. Cheeks narrow. Antennal spine distinct; arista with about ten hairs. Scutellum long as broad and broadly truncate. Abdomen with fourth segment longest and broadest, having about ten, very long, submarginal bristles; segment five short, truncate with a subapical, dorsal, cylindrical tubercle, nearly as long as the segment, bearing at its apex two long, stout bristles and on its lateral surfaces numerous long hairs. Second costal section of wings hardly twice as long as third. Length.—4 to 5 mm.

♀. Similar but face not so flat, with carina visible in profile. Fifth abdominal segment marked as fourth.

Lectotype.—♂; Biscayne Bay, Florida, (Mrs. Slosson), [U. S. N. M. No. 6640]. (Present selection.)

Specimens Examined.—7 ♂, 12 ♀.

FLORIDA: Biscayne Bay, (Slosson), 3 ♂, 2 ♀, [U. S. N. M.]. Lake Worth, (Slosson), 1 ♂, 1 ♀, [U. S. N. M.]. St. Augustine, III. 15 to 20, 1 ♂, 2 ♀, [H. N. M.]; 1 ♀, [A. N. S. P.]; III, 20, (U. of K. Lot 958), 2 ♀, [Kans.].

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LOUISIANA: Cameron, VIII, 14 to 28, 1903, 1 ♂, 4 ♀, [Ohio]. Slidell, VII, 2 to 6, 1905, 1 ♂, [Ohio].

The typical series contained two males and three females from Biscayne Bay and Lake Worth, Florida. There are five males and three females in the U. S. Museum collection from these localities, so it is impossible to distinguish the original series.

This species seems to be confined to the southern Atlantic and Gulf coasts.

Synonymy.—I have a suspicion that this may be *N. transversa* Walker, and also *N. carinata* Coquillett, but I hardly think the latter is probable.

Species described under Notiphila which are not recognized or are synonymized in the material studied.

In the study of a large amount of material which represents many species or forms, it is difficult to recognize with certainty many of the described species, especially in the groups in which the forms are not well marked or are subject to much variation. So many of the species, especially of authors who were not well acquainted with the family, are poorly or superficially described, and it is these which give us the most trouble. In working up a revision of a family from such a mass of material as I have been studying, it is, in my opinion, poor policy to try to recognize species from such poor or insufficient descriptions, if there is any doubt involved. The types in such cases, and in fact in all cases where possible, should be examined. I have therefore refrained from using names of doubtful species. If I am not reasonably certain of a described species I prefer to ignore it, until its type is examined, and more fully described or noted by an authority. I have been unable to examine Loew's types and so am compelled to ignore some of his names. When I am able to study them the species can then be located among those treated in this revision, thus involving but simple synonymy.

In hopes of being able to fix the status of Walker's species I sent, some time ago, to Mr. E. E. Austen of the British Museum of Natural History, some specimens of Ephydridae which seemed to agree, or nearly so, with Walker's descriptions. Mr. Austen kindly sent me notes on such of Walker's types as were available, and these have been valuable to me.

Following is a list of such unrecognized species, accompanied by notes as to their possible or probable relationships and synonymy.

N. alboclavata Bigot

1888. Miss. Scient, Cap. Horn., Dipt. vi, 41, (Cape Horn).

If this is a *Notiphiline* it is unique in having the coxae and femora yellow.

N. argentata Walker

1856. Ins. Saund. v, 407, (United States).

This belongs to the genus *Brachydeutera*.

N. avia Loew

1878. Zeit. f. Ges. Naturw., li, 193, (Hudson Bay Territory).

This seems to be allied to *loewi*. My material is lacking in any series from central Canada.

N. bella Loew

1862. Mon. Dipt. N. Amer., i, 135, (Middle States).

See the synonymy under *nudipes*.

N. bellula Williston

1896. Trans. Ent. Soc. London, 1896, 390, (St. Vincent).

See the synonymical note under *punctifera*.

N. brasiliensis Walker

1856. Dipt. Saund., i, 408, (Brazil).

This is not a *Notiphila*, judging from the length of the antennae as described.

N. carinata Loew

1862. Mon. Dipt. N. Am., i, 137, (Middle States).

The description of this species, based on a female, suggests *furcata*. I hardly think it could be associated with *riparia*.

N. costalis Walker

1856. Dipt. Saund., i, 408, (Brazil).

This evidently does not belong here. The long antennae, the "row of bristles along each eye" and the maculate wings are not characteristic of this genus. The description suggests *Scatella* or an ally.

N. decorata Williston

1896. Trans. Ent. Soc. London, 1896, 389, (St. Vincent).

The black second joint of antennae, the yellow base of third and the quadriseriated abdominal marking suggests affinities with *vittata* Loew.

N. decoris Williston

1893. N. Amer. Fauna, vii, 258, (Panamint Valley, California).

The description suggests species of *Agrolimna*, probably allied to *occidentalis* or *olivacea*.

N. difficilis Wiedemann

1830. Ausser. Zwielf. Ins., ii, 591, (South America).

This may prove to be synonymous with *erythrocer*a. The entire yellow color, with two series of abdominal spots, suggests that species.

N. exotica Wiedemann

1830. Ausser. Zwielf. Ins., ii, 590, (Montevideo).

The yellow color, especially of the antennae and palpi, which are assumed to be this color, and the four series of abdominal spots, suggests *punctifera*.

N. producta Walker

1849. List Br. Mus., iv, 1099, (Hudson Bay).

This species, according to Mr. E. E. Austen, is the same as *Ephydra octonotata* Walker, which belongs to the genus *Parydra*, judging from Austen's notes.

N. pulchrifrons Williston

1897. Kans. Univ. Quart., vi, 5, (Brazil).

Synonym of *frontalis*.

N. quadrisetosa Thomson

1868. Eugen. Resa, Dipt., 594, (California).

This may prove to be the same as my *occidentalis*. The description will cover several of the forms I have from the west coast region.

N. repleta Walker

1849. List of Br. Mus., iv, 1099, (Martin's Falls).

Mr. Austen reports that this species belongs to the *Helomyzidae*.

N. solita Walker

1856. Dipt. Saund., i, 406, (United States).

Evidently a Notiphilid sens. strict., belonging to the quadriseriated abdomen group between *riparia* and *bella*. Mr. Austen, comparing the type with some *erythrocer*a I sent him, says it is similar. *Erythrocer*a, however, is rarely found in the United States. From Austen's suggestions I am inclined to consider it conspecific with our *riparia*.

N. striata Williston

1897. Kans. Univ. Quart., vi, 5, (Brazil).

See note on the synonymy of *virgata*.

N. triangulifera Schiner

1868. Reise Novara, Dipt., 241, (South America)

The description of this species suggests affinities to *olivacea* in the black antennae and tibiae, and the abdominal spots in two series. I do not know of any non-vittate *Agrolimna* from South America. On the other hand it may be allied to the species of the *cinerea* group, near *loewi* or *biseriata*, or, not improbably, allied to *floridensis*.

N. transversa Walker

1856. Dipt. Saund., i, 407, (United States).

Reference to this species may be found under *furcata*.

N. unicolor Loew

1862. Mon. Dipt. N. Amer., i, 137.

See *loewi*.

N. varia Jones

1906. Univ. Cal. Tech. Bull. i, 153, (California).

Synonym of *erythrocerca*.

DICHAETA Meigen

1830. *Dichaeta* Meigen, Syst. Besch., vi, 61.

This genus was originally based on the spinose development of the apical abdominal segment of the male. As this character is not of generic value, we have to resort to other less marked characters. It is not an altogether satisfactory genus, but I have been unable to find any tendency to intergrade with its allies. The only possible apparent associate is *Paralimna decipiens*, a possibility which should not be overlooked. As the species are known at present there is no trouble in limiting the genus.

It is placed with *Notiphila* in the group Notiphilae, and may be distinguished from that genus by the dark color and more shining abdomen of its species. Structurally it is distinguished by the strongly developed proclinate frontal orbital bristle, and, as suggested by Becker,² by the form of the facalia, which are hardly distinguished as longitudinal areas, but more as a ridge, so that the bristles are very close to the parafacial grove, while in *Notiphila* these bristles are separated from the grove by the full width of the broad facalia. Regarding the development of the

² Berl. Ent. Zeit., xli, 105, (1891).

male abdomen, the study of the species of the *furcata*-group of *Notiphila* will soon convince one that such characters are of no generic value. The species of that group do not in any way resemble the species of this genus, except in the spinose development of the male abdomen.

Description.—Dark, robust species, similar to *Notiphila* in most of its characters. Differing as follows: The anterior proclinate fronto-orbital bristle stout and well developed. Face flattened or weakly carinate above, with the median area below broader in proportion to the facalia and orbits; the facalia is very narrow, distinguished as a ridge hardly wider than the bases of the three to four stout facial bristles. The pleura has a more or less stout, upcurved bristle just above the fore coxae; the abdomen is more shining, sometimes polished, with at most only the apical margins of the segments faintly lighter in color; fifth segment of the males of all known species is more or less conically developed, often into a cylindrical prolongation or tubercle bearing two long, approximated, up-curved bristles at the tip; apical margin of fourth segment more or less reflexed, with a subapical series of very long bristles. Middle femora of both sexes with three extensors.

Genotype.—*Notiphila caudata* Fallen (monotypic).

Notes.—The study I have given my material convinces me that the amount of development of the conical apex of the fifth abdominal segment, and the number of bristles on the fourth of the males of this genus are of no specific value. I have a series of twenty-six males showing all intergrades between a simple conically shaped segment, and that with a long, cylindrical tubercle as long as the segment, and from six to thirteen bristles on the fourth segment. In this series I find that the number of hairs on the arista also varies inconsistently. Therefore Loew's *brevicauda*, if not distinct in other respects, is probably merely a synonym of *caudata*. As *brevicauda* was described from Europe, and not having seen specimens, I am not prepared to certify this synonymy. Becker does not given any characters which are not invalidated by the above mentioned study, so no help can be derived from that source. The extremes of my series show slight variation in size and color; the *brevicauda* form being smaller, darker and more shining, while the other extreme is more opaque and varied with light marks and stripes. However these differences are not constant in either form. There is also no correlation in the geographical distribution, as either form may be found in the same locality. The females are similar in every respect.

Dichaeta caudata Fallen

Pl. II, figs. 7 to 11.

1813. *Notiphila caudata* Fallen, Acta Holm., 1813, 249.1830. *Dichaeta caudata* Meigen, Syst Besch., vi, 62, (lviii, 1-6).?1860. *Dichaeta brevicauda* Loew, Neu. Beitr., vii, 5.

Description.—Black; palpi apically, third antennal joint rarely at base, and tarsi, tawny; fore tarsi sometimes dark; halteres yellow. Wings hyaline with veins, especially posterior cross vein, clouded.

Opaque, abdomen and mesonotum somewhat shining, brownish pruinose; face rarely golden. Occiput, thorax anteriorly, anterior rudiments of four mesonotal vittae, pleural spot, apices and median stripe of abdominal segments, more or less obscure grayish or olivaceous.

Eyes vertical. Frons convex, broader than long with orbits parallel. Face vertical in profile, flattened or weakly convexed, nearly as broad as vertex, about twice as long as broad, weakly if at all carinate. Two to four stout bristles on lower half. Cheeks hardly as broad as third antennal joint. Antennal spine strong, nearly as long as third joint; third joint rounded apically; arista with eight to twelve hairs. Scutellum flat. Abdomen elongate ovate; segments successively increasing in length. Wings as figured. Length.—3 to 4 mm.

Type.—Described from Europe.

Specimens Examined.—26 ♂, 24 ♀.

CANADA: Toronto, Ontario, VII, 4, 1913, (M. C. VanDuzee), 1 ♀, [VanD.]. Oxbow, Saskatchewan, V, 15, 1907, (F. Knab), 1 ♂, [U. S. N. M.].

MASSACHUSETTS: Provincetown, VI, 25, 1904, (C. W. Johnson), 2 ♂, 2 ♀, [B. S. N. H., & Kans.].

CONNECTICUT: (S. W. Williston), 1 ♀, [Kans.]. New Haven, VII, 27, 1907, (P. L. Butrick), 1 ♂, [B. S. N. H.].

PENNSYLVANIA: Swarthmore, IV, 21, 1907, (E. T. Cresson, Jr.), 3 ♀, [Cress.]; V, 4, 1907, (E. T. C. Jr.), 1 ♂, [Cress.].

NEW JERSEY: Clementon, V, 5, 1907, 2 ♀, [A. N. S. P.].

MARYLAND: Bay Ridge, VIII, 20, (N. Banks), 1 ♂, [Banks]. Cabin John Bridge, IV, 23, 1914, (R. C. Shannon), 2 ♀, [U. S. N. M.]. Chesapeake Beach, VII, 27, 1913, (R. C. Shannon), 3 ♂, 2 ♀, [U. S. N. M.]. Glymont, V, 25, 1896, 3 ♂, [Johnson & Kans.]. Near Plummer's Island, V, 4, 1915, (R. C. Shannon), 1 ♂, [U. S. N. M.]. District of Columbia, VIII, 19 to 30, 1899, 2 ♂, 1 ♀, [Ohio]. Rock Creek, District of Columbia, X, 26, 1913, (R. C. Shannon), 2 ♂, [U. S. N. M.].

VIRGINIA: Dead Run, Fairfax County, XI, 18, 1913, 1 ♀; IV, 18, 1915, 1 ♀; V, 23, 1915, 1 ♀; all (R. C. Shannon), all [U. S. N. M.]. Rosslyn, IV, 23, 1913, 1 ♂, 1 ♀, V, 8, 1913, 1 ♀, all (R. C. Shannon), all [U. S. N. M.].

OHIO, all [Ohio]: Ashtabula, 1 ♀. Medina, V, 21, 1 ♀. Sandusky, VII, 1914, 1 ♂. Wauseon, VIII, 25 to IX, 17, 1902, 3 ♂.

ILLINOIS: McHenry County, IX, 1903, 1 ♀, [Wash.].

NORTH DAKOTA: Fargo, V, 10, 1901, 3 ♂, 1 ♀, [Ohio].

IDAHO: Potlatch, VI, 20, 1907, (J. M. Aldrich), 1 ♀, [Aldrich].

OREGON: Oregon City, IX, 1 ♂, [Wash.].

Variations and Synonymy.—See notes under the generic discussion.

Var. **atriventris** Cresson

1915. *Dichaeta atriventris* Cresson, Ent. News., xxvi, 68

I doubt if this is a distinct species. The additions to the series of *caudata*, coming to hand since the publication of this form, reveal the tendency of some individuals to become unicolorous and shining on the thorax. A good series of typical specimens of this form may show characters not known at present, which will warrant specific recognition. This variety is distinguished by its small size, unicolorous shining black abdomen, and hyaline wings, which have no trace of clouding on the veins. Length.—3 mm.

Holotype.—♂; Colorado Springs, Colorado, 5915 ft. alt., August, (E. S. Tucker), [Kans.]. *Paratype*.—1 ♂; topotypical.

Before me are also two females; Yosemite Valley, V, 22, 1908, (E. T. Cresson, Jr.), [A. N. S. P.]; which I also place here, there being no variation worthy of note.

EXPLANATION OF PLATES

Plate I

- Fig. 1—*Notiphila virgata*. Head in profile. ×40.
 Fig. 2—*Notiphila virgata*. Middle femur and tibia. ×40.
 Fig. 3—*Notiphila virgata*. Wing. ×30.
 Fig. 4—*Notiphila macrochaeta*. Hind tibia and base of tarsi. ×40.
 Fig. 5—*Notiphila bispinosa*. Apical segment of abdomen. ×40.
 Fig. 6—*Notiphila furcata*. Apical segment of abdomen. ×40.

Plate II

- Fig. 7—*Dichaeta caudata*. Head in profile. ×40.
 Fig. 8—*Dichaeta caudata*. Middle tibia. ×40.
 Fig. 9—*Dichaeta caudata*. Wing. ×30.
 Fig. 10—*Dichaeta caudata*. Apical segment of abdomen. ×40.
 Fig. 11—*Dichaeta caudata*. (var. ? *brevicauda* Loew.) Apical segment of abdomen. ×40.



